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Biochemical and pathological changes in the male rat kidney and bladder following exposure to continuous 900-MHz electromagnetic field on postnatal days 22–59*

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Abstract

Purpose: To investigate the effect on male rat kidney and bladder tissues of exposure to 900-megahertz (MHz) electromagnetic field (EMF) applied on postnatal days 22–59, inclusive.

used. These were divided equally into one of three groups, control (CG), sham (SG) or EMF (EMFG). CG was not exposed to any procedure. SG rats were kept inside a cage, without being exposed to the effect of EMF, for 1 h a day on postnatal days 22–59, inclusive. EMFG rats were exposed to continuous 900-MHz EMF for 1 h a day under the same conditions as those for the SG rats. Rats were sacrificed on postnatal day 60, and the kidney and bladder tissues were removed. Tissues were stained with hematoxylin and eosin (H&E) and Masson trichrome for histomorphological evaluation. The TUNEL method was used to assess apoptosis. Transmission electron microscopy (TEM) was also used for the kidney tissue. Oxidant/antioxidant parameters were studied in terms of biochemical values.

Results: The findings showed that tissue malondialdehyde increased in EMFG compared to CG and SG in both kidney ($p = 0.004$ and $p = 0.004$, respectively) and bladder tissue ($p = 0.004$, $p = 0.006$, respectively), while catalase and glutathione levels decreased compared to CG ($p = 0.004$; $p = 0.004$, respectively) and SG ($p = 0.004$; $p = 0.004$, respectively). In the EMF group, pathologies such as dilatation and vacuolization in the distal and proximal tubules, degeneration in glomeruli and an increase in cells tending to apoptosis were observed in kidney tissue. In bladder tissue, degeneration in the transitional epithelium and stromal irregularity and an increase in cells tending to apoptosis were observed in EMFG. Additionally, EMFG samples exhibited glomerular capillary degeneration with capillary basement membranes under TEM.

Conclusions: We conclude that continuous exposure to the effect of 900-MHz EMF for 1 h a day on postnatal days 22–59, inclusive, causes an increase in oxidative stress and various pathological changes in male rat kidney and bladder tissues.

Keywords: Electromagnetic field kidney bladder oxidative stress male rat

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Disclosure statement

content and writing of the paper.

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Source: Elsevier BV
Identification of occupational cancer risks in British Columbia: a population-based case-control study of 1129 cases of bladder cancer.
Source: Ovid Technologies (Wolters Kluwer Health)
Zinc prevention of electromagnetically induced damage to rat testicle and kidney tissues.

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A novel antioxidant agent caffeic acid phenethyl ester prevents long-term mobile phone exposure-induced renal impairment in rat. Prognostic value of malondialdehyde, N-acetyl-beta-D-glucosaminidase and nitric oxide determination.

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Effects of 900-MHz electromagnetic field emitted from cellular phone on brain oxidative stress and some vitamin levels of guinea pigs

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Possible effects of electromagnetic fields (EMF) on human health--opinion of the scientific committee on emerging and newly identified health risks (SCENIHR).

Source: Elsevier BV

Tolerance of Spermatogonia to Oxidative Stress Is Due to High Levels of Zn and Cu/Zn Superoxide Dismutase

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